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CURR HIST



EDUCATION

DEFINED VALUES AND PHYSICAL CONSTANTS

Alberta Education

2019

1.25 x 10³ m/s² (acceleration due to gravity)

Standard acceleration due to gravity

$g = 9.80 \text{ m/s}^2$

Standard value of π

$\pi = 3.1415926535897932384626433832795$

Standard value of e

$e = 2.7182818284590452353602874713527$

Standard acceleration of gravity

$g = 9.80 \text{ m/s}^2$

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Standard value of π

PHYSICS DATA BOOKLET

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DEFINED VALUES AND PHYSICAL CONSTANTS

Absolute zero	—273°C
1 amp	6.24×10^{18} elementary charges/sec
Charge of electron e	1.60×10^{-19} C
Coulomb of charge C	6.24×10^{18} elementary charges
Electron rest mass m_e	9.109×10^{-31} kg
Mechanical equivalent of heat	4.20 J/cal
Standard acceleration of gravity g	9.8 m/sec ² 32 ft/sec ²
Standard atmospheric pressure atm	760 mm of Hg
Velocity of sound in air at 0°C	1090 ft/sec 331 m/sec
Velocity of sound in air at 20°C	1129 ft/sec 344 m/sec

IMPORTANT EQUATIONS

Motion, Matter, and Energy

Uniform velocity

$$v = \frac{s}{t}$$

Average velocity

$$v_{av} = \frac{s}{t}$$

$$v_{av} = \frac{v_1 + v_2}{2}$$

Acceleration

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time interval}}$$

or

$$a = \frac{v_2 - v_1}{t}$$

or

$$a = \frac{\Delta v}{\Delta t}$$

Centripetal acceleration (acceleration in circular motion)

$$a = \frac{v^2}{r}$$

Displacement of a uniformly accelerated object

$$s = v_1 t + \frac{1}{2} a t^2$$

Newton's second law of motion

$$\text{or } F = ma$$

$$F = \frac{\Delta(mv)}{\Delta t}$$

or

$$F = \frac{W a}{g}$$

Newton's law of universal gravitation

$$F = G \frac{m_1 m_2}{s^2}$$

Weight

$$W = mg$$

Law of conservation of momentum

$$\text{total momentum before an action} = \text{total momentum after action}$$

Centripetal force

$$\text{centripetal force} = \frac{W v^2}{g r}$$

Work

$$\text{work} = F s$$

$$\text{work} = F s \cos \theta$$

Power

$$P = \frac{F s}{t}$$

or

$$P = F v$$

Potential energy

$$\text{or } E_p = mgh$$

$$E_p = Wh$$

Kinetic energy

$$\text{or } E_k = \frac{1}{2} m v^2$$

$$\text{or } E_k = \frac{W v^2}{2g}$$

or

$$E_k = (m - m_0) c^2$$

Relativistic mass

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}}$$

Energy equivalent of mass change

$$E = \Delta m c^2$$

Coulomb's law

$$F = k \frac{Q_1 Q_2}{s^2}$$

Forces and Machines

Resultant of concurrent forces

$$\vec{R} = \sum \vec{F}$$

Equilibrium law

$$\sum F_x = 0$$

and

$$\sum F_y = 0$$

Moment of a force

$$M = FL$$

Law of moments

$$\sum M \text{ (clockwise)} = \sum M \text{ (counterclockwise)}$$

or

$$\sum M = 0$$

Frictional force

$$F_f = kF_n$$

Coefficient of friction

$$k = \frac{F_f}{F_n}$$

Specific gravity

specific gravity

$$= \frac{\text{weight of object}}{\text{weight of equal volume of water}}$$

or

$$\text{specific gravity of X} = \frac{\text{density of X}}{\text{density of water}}$$

Mass density

$$d_m = \frac{m}{V}$$

Weight density

$$dw = \frac{W}{V}$$

Pressure

$$P = \frac{F}{A}$$

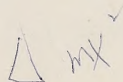
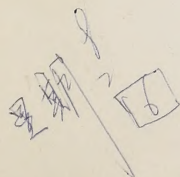
Pressure in a liquid

$$P = hd_w$$

Archimedes' principle

buoyant force = weight of displaced fluid

$\Delta m \times 10^{-2}$



F_m

$$F = \frac{K}{NO}$$

CP Air

in downston

Molecules and Heat Energy

Hooke's law

$$\Delta l = k \Delta F$$

Boyle's law

$$PV = k$$

or

$$P_1 V_1 = P_2 V_2$$

Linear coefficient of thermal expansion

$$\alpha = \frac{\Delta l}{l \Delta t}$$

Law of Heat Exchange

heat lost = heat gained

Heat transferred

$$\Delta Q = mc \Delta t$$

$$\Delta Q = mL$$

Charles' law

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

General gas law

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

Wave Motion

Frequency of a pendulum

$$f = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$$

Period of vibration

$$T = \frac{1}{f}$$

Speed of waves

$$v = f\lambda$$

Air columns and wavelength:

Column closed at one end

$$L = \frac{\lambda}{4}, \frac{3\lambda}{4}, \frac{5\lambda}{4}, \text{ etc.}$$

Column open at both ends

$$L = \frac{\lambda}{2}, \frac{2\lambda}{2}, \frac{3\lambda}{2}, \text{ etc.}$$

Wavelength of light from Newton's rings

$$2t = n\lambda$$

Wavelength of light using a diffraction grating

$$\lambda = \frac{d \sin \theta}{n}$$

Electricity and Magnetism

Quantity of charge

$$Q = It$$

Rays and Radiation

Location of image formed by a mirror or lens

$$\frac{1}{D_o} + \frac{1}{D_i} = \frac{1}{f}$$

Magnification (mirror or lens)

$$M = \frac{S_i}{S_o}$$

or

$$M = \frac{D_i}{D_o}$$

Law of illumination

$$E = \frac{I}{s^2}$$

Index of refraction

$$n = \frac{c}{v_m}$$

or

$$n = \frac{v_a}{v_m}$$

Snell's law

$$n = \frac{\sin a}{\sin m}$$

Critical angle

$$n = \frac{1}{\sin c}$$

Electric field intensity

$$E = \frac{F}{Q}$$

Potential difference

$$V = \frac{\text{Energy}}{Q}$$

Ohm's law

$$I = \frac{V}{R}$$

Potential difference across a resistor
(IR drop)

$$V = IR$$

Total resistance in series

$$R_T = R_1 + R_2 + R_3$$

Total resistance in parallel

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Kirchoff's Second Rule

Σ potential differences around
a loop = 0

Power

$$P = VI$$

or

$$P = I^2 R$$

or

$$P = \frac{V^2}{R}$$

Capacitance

$$C = \frac{Q}{V}$$

Force on a moving charge in a magnetic
field

$$F = BQv$$

Magnetic flux

$$\Phi = BA$$

Force on a current across a magnetic field
(motor effect)

$$F = BIl$$

Emf in a conductor moving perpendicularly
across a magnetic field

$$V = Blv$$

Generated (induced) emf

$$V = \frac{\Delta\Phi}{\Delta t}$$

PERIODIC TABLE

PERIOD										GROUP										GROUP 0
1		GROUP 1A 2A		TRANSITION ELEMENTS										GROUP					2	
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TABLE OF NATURAL TRIGONOMETRIC FUNCTIONS

Angle	Sine	Cosine	Tangent	Angle	Sine	Cosine	Tangent
1°	.0175	.9998	.0175	46°	.7193	.6947	1.0355
2°	.0349	.9994	.0349	47°	.7314	.6820	1.0724
3°	.0523	.9986	.0524	48°	.7431	.6691	1.1106
4°	.0698	.9976	.0699	49°	.7547	.6561	1.1504
5°	.0872	.9962	.0875	50°	.7660	.6428	1.1918
6°	.1045	.9945	.1051	51°	.7771	.6293	1.2349
7°	.1219	.9925	.1228	52°	.7880	.6157	1.2799
8°	.1392	.9903	.1405	53°	.7986	.6018	1.3270
9°	.1564	.9877	.1584	54°	.8090	.5878	1.3764
10°	.1736	.9848	.1763	55°	.8192	.5736	1.4281
11°	.1908	.9816	.1944	56°	.8290	.5592	1.4826
12°	.2079	.9781	.2126	57°	.8387	.5446	1.5399
13°	.2250	.9744	.2309	58°	.8480	.5299	1.6003
14°	.2419	.9703	.2493	59°	.8572	.5150	1.6643
15°	.2588	.9659	.2679	60°	.8660	.5000	1.7321
16°	.2756	.9613	.2867	61°	.8746	.4848	1.8040
17°	.2924	.9563	.3057	62°	.8829	.4695	1.8807
18°	.3090	.9511	.3249	63°	.8910	.4540	1.9626
19°	.3256	.9455	.3443	64°	.8988	.4384	2.0503
20°	.3420	.9397	.3640	65°	.9063	.4226	2.1445
21°	.3584	.9336	.3839	66°	.9135	.4067	2.2460
22°	.3746	.9272	.4040	67°	.9205	.3907	2.3559
23°	.3907	.9205	.4245	68°	.9272	.3746	2.4751
24°	.4067	.9135	.4452	69°	.9336	.3584	2.6051
25°	.4226	.9063	.4663	70°	.9397	.3420	2.7475
26°	.4384	.8988	.4877	71°	.9455	.3256	2.9042
27°	.4540	.8910	.5095	72°	.9511	.3090	3.0777
28°	.4695	.8829	.5317	73°	.9563	.2924	3.2709
29°	.4848	.8746	.5543	74°	.9613	.2756	3.4874
30°	.5000	.8660	.5774	75°	.9659	.2588	3.7321
31°	.5150	.8572	.6009	76°	.9703	.2419	4.0108
32°	.5299	.8480	.6249	77°	.9744	.2250	4.3315
33°	.5446	.8387	.6494	78°	.9781	.2079	4.7046
34°	.5592	.8290	.6745	79°	.9816	.1908	5.1446
35°	.5736	.8192	.7002	80°	.9848	.1736	5.6713
36°	.5878	.8090	.7265	81°	.9877	.1564	6.3138
37°	.6018	.7986	.7536	82°	.9903	.1392	7.1154
38°	.6157	.7880	.7813	83°	.9925	.1219	8.1443
39°	.6293	.7771	.8098	84°	.9945	.1045	9.5144
40°	.6428	.7660	.8391	85°	.9962	.0872	11.4301
41°	.6561	.7547	.8693	86°	.9976	.0698	14.3007
42°	.6691	.7431	.9004	87°	.9986	.0523	19.0811
43°	.6820	.7314	.9325	88°	.9994	.0349	28.6363
44°	.6947	.7193	.9657	89°	.9998	.0175	57.2900
45°	.7071	.7071	1.0000	90°	1.0000	.0000	

Table of Prefixes

The following prefixes are used to indicate decimal fractions or multiples of units in the metric system.

FRACTIONS			MULTIPLES		
Prefix	Value	Symbol	Prefix	Value	Symbol
deci	10^{-1}	d	kilo	10^3	k
centi	10^{-2}	c	mega	10^6	M
milli	10^{-3}	m	giga	10^9	G
micro	10^{-6}	μ	tera	10^{12}	T
nano	10^{-9}	n			
pico	10^{-12}	p			



LB 3054 C2 D392B DATA-BK-
PHYSICS ACHIEVEMENT TEST --

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